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Last Semester's Enduring Impressions

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Abstract

The increased recollection of events occurring at the beginning and end of a period, known as the end point effect, is a phenomenon widely reported in the autobiographical memory literature. We used an interview method to explore the end point effect and to find out what impressions students retain for an academic semester. Participants recounted recollections of events from an academic course that was completed in their immediately preceding semester, and then they rated each recollection on a variety of attributes such as emotionality and vividness. The results showed recollection peaks corresponding to the semester midpoint as well as corresponding to the endpoints of the semester; the results also showed that distinct content defined recollections contributed to the mid- and endpoints. The discussion focuses on the qualitative versus quantitative examination of autobiographical memory.

Key words: Autobiographical memory; End point effect; Serial position effect; Content analysis

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INTRODUCTION

In autobiographical memory, the end point effect refers to the increased recollection of episodes related to the beginnings and endings of a temporally distributed event. This effect has been interpreted in terms of the organizational influence exerted by the knowledge system used for encoding and recollecting events and experiences. Previous research proposed that period beginning and ending events may receive more elaborate memory processing, may be distinct from an established script, and thus better remembered. These "first-time" and "last-time" experiences may also be assigned a special status in the personal narrative, they may trigger intense emotional reactions, and consequently make the experiences especially memorable.

An implication of these findings is that the end point effect might only occur or might be more pronounced in the connection to truly novel life experiences (e.g., a person's first year at university); the effect may be less pronounced with experience in a particular life domain. We assume that by the third or fourth year in university, students may no longer process semester beginning and ending events as truly distinct first-time or last-time experiences; such events would be unlikely to trigger the same intense emotional reactions. To examine this expectation, the present study compared lower year and upper year university students' memory for events and experiences associated with a course completed in their immediately preceding academic semester.

An additional objective of the present study was to explore the generality of previously reported end point effects by using an interview method and content analysis to gain insight into the qualitative characteristics of recollected events. We were interested in whether the end point effects reported in previous research were associated with the properties such as vividness, distinct emotional states, and distinct content domains.

1. LAST SEMESTER'S ENDURING IMPRESSIONS

The serial position effect—elevated memory for items from the beginning and ending of a series—is a ubiquitous phenomenon. It occurs when the task is to recollect a

list of recently presented unrelated words or similar materials (Murdock, 1974), when responding to polls and interviews (Carp, 1974), when remembering television commercials that occurred during the course of a show (Terry, 2005), and even when making wine preference decisions (Mantonakis et al., 2009). A similar pattern of performance, known as the end point effect, occurs in autobiographical memory, with increased recollection of episodes related to the beginnings and endings of occurrences spanning several days, weeks, months, or years. This latter phenomenon has been reported in the recollection of films seen over a period of 20 weeks (Hitch & Ferguson, 1991), in students' recollection of events from a previous academic semester (Thomsen & Berntsen, 2005), in rugby players' memory for a season of games (Baddeley & Hitch, 1977), and even when remembering details related to 25 opera seasons (Sehulster, 1989).

The end point effect has been interpreted in terms of the organizational influence exerted by the knowledge system used for encoding and recollecting events and experiences. This knowledge system is assumed to include a set of scripts for routine life events (e.g., Pillemer et al., 1986) or a self-constructed personal narrative of such events (Robinson, 1992; Thomsen & Berntsen, 2005). Pillemer et al. (1986) speculated that the period beginning and ending events may require and receive more elaborate memory processing and thus be distinct and better remembered by virtue of not easily fitting into an established script. Similarly, Robinson (1992) as well as Thomsen and Berntsen (2005) proposed that period beginning and ending events may be accorded a special status in a personal narrative by being "first-time" and "last-time" experiences, and as such, they may trigger intense emotional reactions and thereby become especially memorable.

One implication of the foregoing accounts is that the end point effect might occur only, or might be more pronounced in connection with truly novel life experiences, such as a person's first romantic relationship or first year at university. It would seem reasonable to assume that by the 3rd or 4th year in university, for example, students have well defined scripts for encoding semester beginning and ending events, that such events would no longer be truly distinct as first-time or last-time experiences, and thus would likely no longer trigger the same intense emotional reactions. For these reasons, it would seem likely that the end point effect would decrease with experience in a particular life domain. To examine this expectation, the present study compared lower year (1st and 2nd year) with upper year (3rd and 4th year) university students' memory for events and experiences associated with a course completed in the most recent academic semester.

An additional objective of the present study was the generality of the findings from previous investigations, and more particularly, the possibility that those findings might have been constrained by the data collection method that was used. Studies by Thomsen and Berntsen (2005) underscore this point. They used a questionnaire which required participants to recollect and report in written form memories from a past romantic relationship (Experiment 1) and for Experiment 2 to "think back upon their first semester as psychology students …and to recall [in writing] five memories of specific episodes" (p.852). The participants also were required to place each remembered episode on a time line and to rate it on a number of characteristics, such as vividness, importance, and emotional intensity.

Thomsen and Berntsen (2005) focused entirely on the data from the latter rating scales and the subjects' time line placements. We are not questioning the value of these data. Instead, our purpose in the present study was to gain insight into the qualitative nature of the memories that are retrieved with a procedure like that used by Thomsen and Berntsen. More particularly, we wished to know whether the end point effects they reported were associated with properties such as vividness, distinct emotional states, or distinct content domains. Consistent with the interpretation of the end point effect by Robinson (1992) and by Thomsen and Berntsen (2005), a content analysis might be used to verify whether a preponderance of first-time and last-time experiences are placed, respectively, at the recall period beginning and ending.

In order to investigate this possibility, we asked undergraduate student participants to recollect 10 distinct events or experiences from a university course they completed in the most recent academic semester. In addition, we asked them to place each recollected event on a time line, as well as to rate its vividness and to identify the dominant emotions associated with it.

2. METHOD

2.1 Participants

Thirty-seven undergraduate student volunteers (11 male; 26 female) participated for partial course credit. Nineteen of the participants were in their first or second year of their university studies, and 18 were in their third or fourth year. Each provided written consent for participation in the experiment which was approved by the University of British Columbia Behavioral Research Ethics Board.

2.2 Procedure

Participants took part individually, in a single session which lasted about 45 minutes. After consenting to participation, in the memory generation phase of the study, each participant was required to recollect 10 distinct events or experiences related to a specific university course he/she had completed during the immediately preceding academic semester (note: all participants were tested from February to April 2012, and thus, the recollected events and experiences could be as 'young' as 2 months of age or as 'old' as 7 months of age). To emphasize this requirement, participants

were first asked to name a specific academic course they completed during the preceding semester, thereby priming memory for course related events and experiences. The instructions specified that each recollection had to be distinct, had to have a clear beginning and ending, and had to be described briefly in one to three sentences. All recollections were recorded verbatim by the experimenter, and read back to the participant for his/her immediate verification. Participants who struggled with recollecting a complete set of 10 memories were encouraged to keep trying and to visualize course/class activities.

In the next phase which followed immediately, the transcribed memories were read back, one at a time, and the participant was required to answer the following series of questions about each. First, they were asked about the date of the memory, and more particularly about the week of the academic semester (1st, 2nd, etc.) in which the event had occurred. If unable to recollect the precise week, participants were asked to indicate the 2-week period, 3-week period, etc. in which the event had occurred. The second question asked about the vividness of the memory. For this purpose, we displayed a 4-point scale with "very low vividness" on one end and "very high vividness" on the other end, and participants selected the scale point corresponding to the vividness of each memory. Finally, we asked participants to identify up to three main emotions associated with each memory. For this purpose, we used a printed page with six primary emotions (happy, surprise, fear, anger, sadness, and disgust), each of them displayed as a distinct emoticon together with a printed label, and participants selected the item or items most strongly associated with the recollected event. If none of the listed emotions was deemed appropriate, participants were encouraged to give their label for the main emotion associated with the event.

The final phase of the experiment began with a brief semi-structured interview designed to learn about the strategies participants used for recollecting events and experiences, and to identify difficulties associated with producing 10 distinct recollections. The interview began with an open-ended question about what it was like to recollect events and experiences from the preceding academic semester, and it included specific questions on how many distinct events could be recollected with ease. Following the interview, participants were debriefed and dismissed.

3. DATA PREPARATION

In order to identify temporal patterns in participants' recollections, it was necessary to allocate each recollected event or experience to a specific segment of the 13-week academic semester. This allocation was not straightforward because participants sometimes described events as having occurred, for example, during the first two weeks of the semester or in the middle of October. To cope with these types of descriptions, we scored each recollection as a 1, and we increased the count for a week by 1 point for every recollection assigned to it. For recollections ascribed to a 2-week period, we increased the count for these weeks by ½ point. More generally, we divided the 1-point count for each recollection by the number of weeks implied by the description provided by the participant, and we increased the count for the affected weeks by the corresponding fractional amount.

The participants in the present study were required to rate the vividness of each recollection and to name the main emotion(s) associated with each recollection. In addition, we scored the content of each recollection, first, according to whether it was primarily about the participant, others in the same academic course, or us (i.e. the participant and others in the same course), and second, according to whether the recollection was primarily about the course instructor, course materials, course assessments, or mishaps (i.e. things that went wrong in the course). The scores obtained from these content analyses, as well as the vividness ratings and the emotion assignments produced by participants were allocated to the 13-week academic semester in the manner referred in the preceding paragraph.

4. RESULT

A preliminary analysis showed that the length of participants' event recollections ranged from one to four sentences, with a mean of 27.89 words per recollection (*SD* = 13.40 words). According to the Flesch-Kincaid Grade Level comprehension difficulty measure (Flesch, 1948) provided by Microsoft Word, the recollections scored a mean Grade Level of 7.91 (*SD* = 3.56). *T*-test comparisons of the recollections produced by participants in their 1st or 2nd year of university studies versus those in their 3rd or 4th year showed no significant difference in either word length or grade level.

All participants were able to recollect 10 unique events or experiences. When scored according to the method described in the preceding section, the recollections showed the temporal pattern depicted in the top panel in Figure 1. In view of the findings from the closely related previous research by Thomsen and Berntsen (2005), we were surprised by the absence of distinct end point effects in the data. However, it is possible that the difference between our findings and those reported by Thomsen and Berntsen (2005) comes from the method, more specifically from the fact that their participants were required to recollect only five specific episodes whereas we asked ours to recollect 10 episodes. In our end-of-experiment interview, a significant proportion of participants (35%) revealed that they had struggled to come up with further distinct events or experiences after providing the 4th recollection. It is possible that in order to comply with our request for 10

recollections, that is when participants began to struggle with the task, they engaged in a different memory retrieval strategy, which in turn served to obscure the expected temporal patterns.

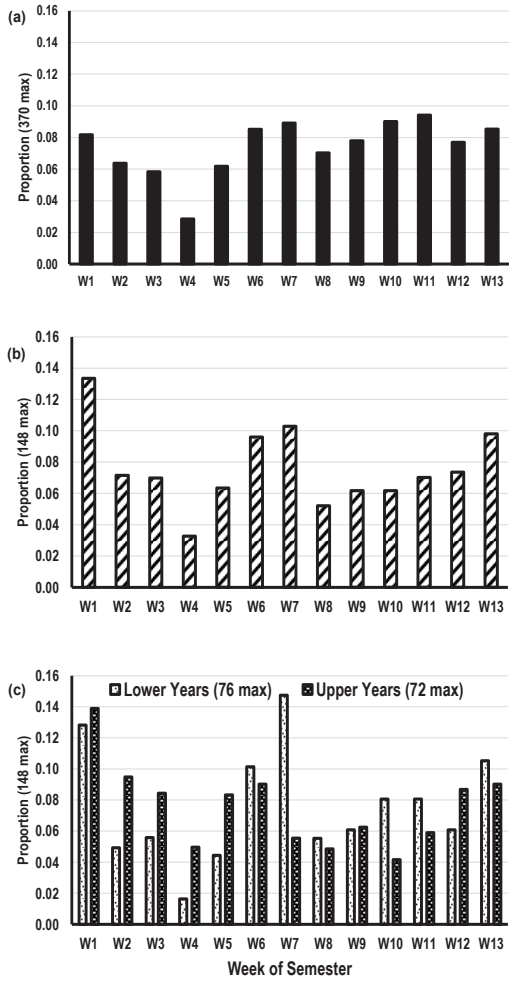

Figure 1
(a) Proportion of All Recollections (370 maximum) Produced Per Week of the Academic Semester, (b) Proportion of Initial 4 Recollections (148 maximum) Produced Per Week of the Academic Semester, (c) Proportion of Initial 4 Recollections Produced Per Week of the Academic Semester by Lower Year Students (76 recollections) and Upper Year Students (72 recollections)

In order to explore this possibility, we focused on the initial four recollections provided by the participants, and they showed the temporal pattern depicted in the middle panel of Figure 1. The bottom panel of Figure 1 shows the same data, but with distinct bars for the recollections produced by lower year students (1st and 2nd; 76 recollections) versus upper year students (3rd and 4th; 72 recollections). Chi-square analyses conducted to explore the temporal distribution of the data in the middle and bottom panels of Figure 1 showed no significant effects, probably because our total number of recollections was too low.

We asked participants to rate each recollection on a 4-point vividness scale, and we used correlation analysis to explore whether the pattern of recollection in the middle panel of Figure 1 is related to recollection vividness. The results showed only a weak and non-significant correlation between vividness and semester week, r (11) =.14.

Consistent with the content focus of the present study, we examined whether the recollections from different portions of the academic semester were characterized by different primary emotions. However, in view of the relatively small number of recollections that received each distinct emotion label (e.g., happy, surprise, fear, anger, sadness, and disgust), we grouped the recollections into 3 distinct time bins, the first with recollections from weeks 1 through 4, the second with recollections from weeks 5 through 9, and the third with recollections from weeks 10 through 13. A preliminary analysis showed the same temporal pattern for recollections associated with anger, fear, disgust and sadness, and thus we grouped them together as being associated with a negative emotion.

The outcome of these grouping efforts is summarized in Figure 2, which has separate panels for the recollections associated with happiness (top panel), surprise (middle panel) and negative emotions (bottom panel). Approximately the same number of recollections were associated with happiness (68), surprise (54) and negative emotions (63), but the recollections of these categories showed different temporal distributions in the lower and upper year students. The negatively tinged recollections highlight the differences. For lower year students, their frequency increased across the semester and reached its peak at the end of the semester (i.e. around final exam time), whereas for upper year students negative recollections peaked in middle of the semester (i.e. around the time of mid-semester tests). The happiness linked recollections showed a distinctly different pattern; they peaked around the middle of the semester for the lower year students but were evenly distributed across the entire semester for upper year students. Finally, the surprise associated recollections showed the same pattern as those linked with happiness, except that for the upper year students they peaked at the semester beginning.

A separate analysis focused on the point of view which characterized each recollection, and more specifically, on whether the recollection was primarily about "I" (the participant; 64 recollections), "them" (other people; 97 recollections) or "us" (the participants and others; 66 recollections). The results are summarized in Figure 3. The middle panel of the figure shows that recollections about "them" were equally common in lower and upper year students, and were evenly distributed across the academic semester. The "us" recollections (bottom panel of Figure 3) showed a similar pattern, but with distinct peak in the

middle of the semester for lower year students but not upper year students. Finally, "I" dominant recollections (top panel of Figure 3) were more common in upper than lower year students at the beginning of the semester; but their occurrence decreased across the semester for upper year students, while peaking in the middle of the semester for lower year students.

A final analysis focused on the content or theme for each recollection. We scored the recollections of a number of different themes, and discovered four common

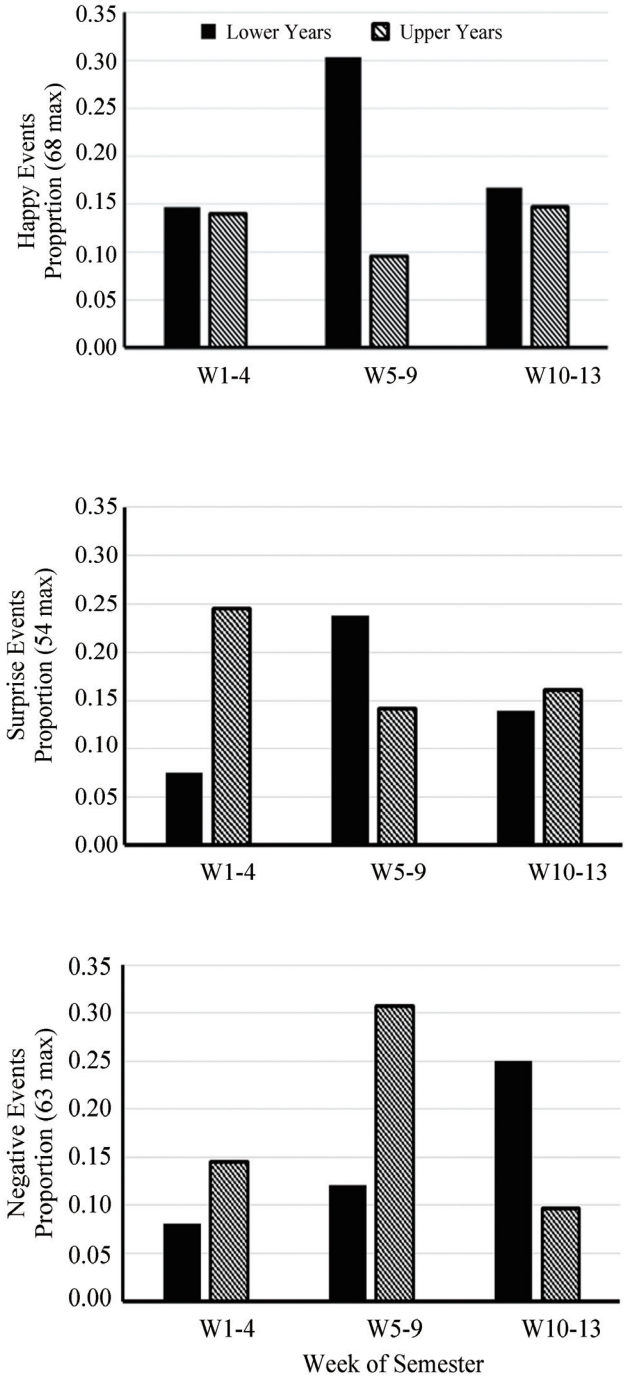

Figure 2
Proportion of Recollections Classified as Happy Events (42 and 26, Respectively, for Lower and Upper Year Students), Surprise Events (24 and 30, Respectively, for Lower and Upper Year Students), and Negative Events (29 and 34, Respectively, for Lower and Upper Year Students) as a Function of Week of the Academic Semester

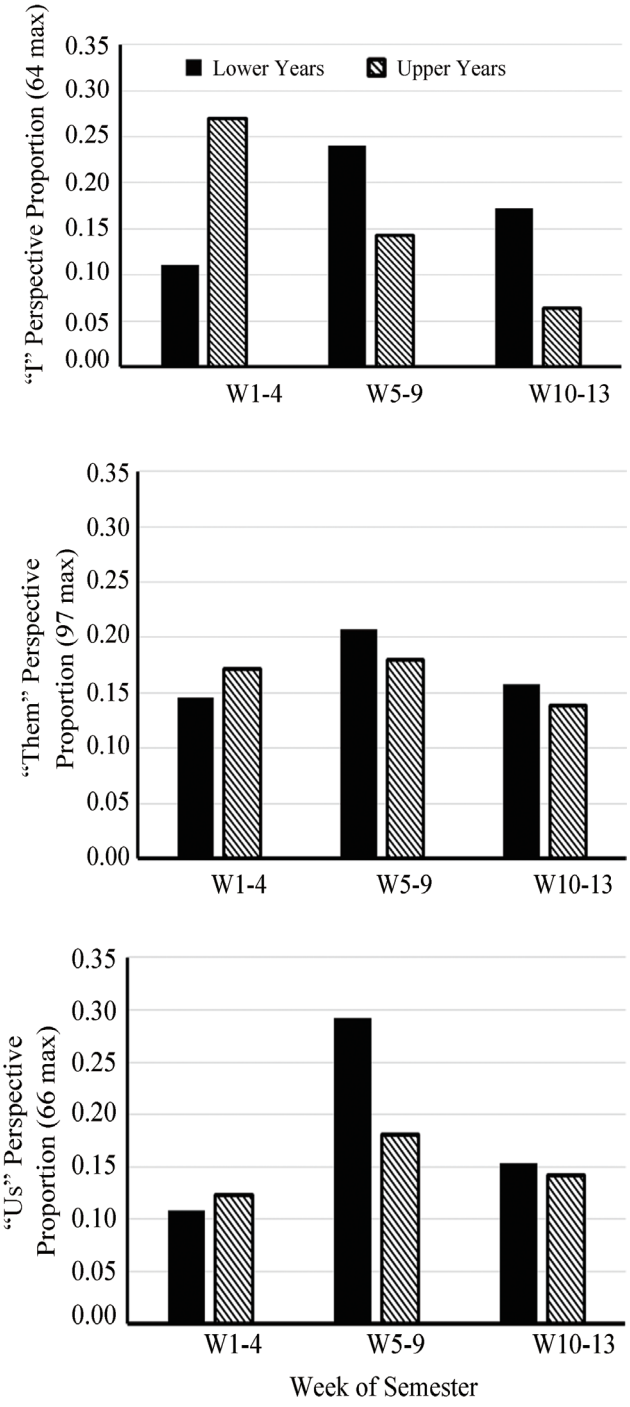

Figure 3
Proportion Recollections With an "I" Perspective (33 and 31, Respectively, for Lower and Upper Year Students), a "Them" Perspective (49 and 48, Respectively, for Lower and Upper Year Students), and an "Us" Perspective (37 and 29, Respectively, for Lower and Upper Year Students) as a Function of Week of the Academic Semester

themes: instructor (117 recollections), course content (75 recollections), assessments (62 recollections) and mishaps (47 recollections). The temporal distributions of recollections fitting each of these themes are shown in Figure 4. The figure shows that recollections about mishaps and course content were fairly evenly distributed across the academic semester. By contrast, assessment related recollections showed an increase toward the end of the semester, whereas instructor associated recollections showed the opposite pattern, with a steady decline across the semester.

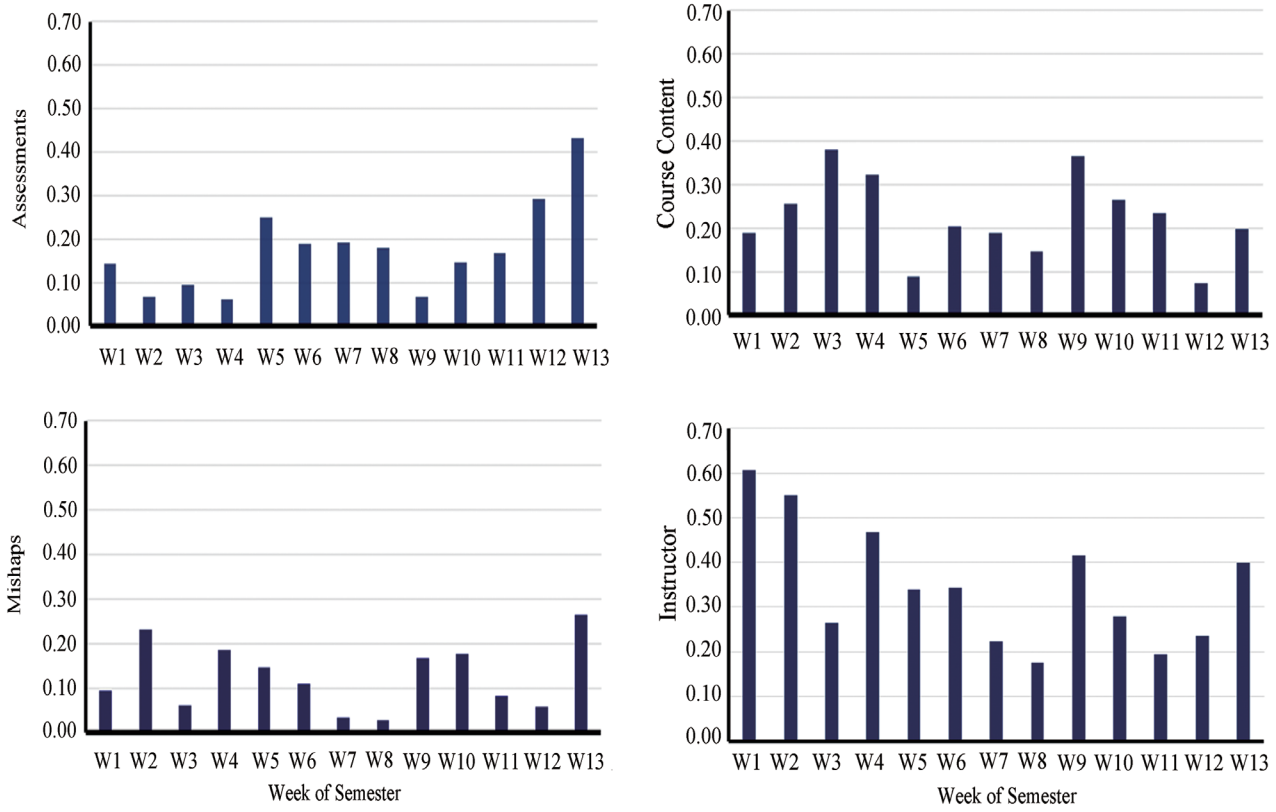

Figure 4
Proportion of Recollections Allocated to Each Week of the Academic Semester That Focused on Assessment (62 Recollections), Mishaps (47 Recollections), Course Material (75 Recollections), and Instructor (117 Recollections)

5. DISCUSSION

The present study had two main purposes: First, to investigate whether the end point effects reported previously (Robinson, 1992; Thomsen & Berntsen, 2005) might be due to recollections which differ in terms of their qualitative characteristics, and second, to find out how the end-points might be affected by the amount of experience an individual has in a specialized domain. To address the first purpose, we scored recollections for their emotional tone, point of view, and thematic content, and in the pursuit of the second purpose, we compared the recollections produced by lower and upper year university students.

Our study showed a pattern of recollection which differed somewhat from that reported previously (e.g., Pillemer & Goldsmith, 1988; Robinson, 1992; Thomsen & Berntsen, 2005). Consistent with previous research, we found recollection peaks corresponding to the beginning (c.f. Pillemer & Goldsmith, 1988; Thomsen & Berntsen, 2005) and ending of an academic semester (c.f. Robinson, 1992). However, we also found a recollection peak around the midpoint of the semester.

The differences between our findings and those from previous studies are likely due to several factors, including the length of the retention interval. Our participants recollected events that were 2 to 4 months old, whereas the participants in the study by Pillemer and Goldsmith (1988) recollected events from 2 to 3 years earlier. [Thomsen and Berntsen (2005) also asked participants to recollect events from their first semester of university study, but the method section does not provide a basis for estimating the length of the retention interval.] Related research has shown that not all memories decay at the same rate (Talarico, 2012), and that the strongest or most vivid memories are more likely to endure (Zeilig & Nachson, 2012). Consistent with such research, it is possible that the differences between our findings and those from previous studies (e.g., Pillemer & Goldsmith, 1988; Thomsen & Berntsen, 2005) are

attributable at least in part to retention interval differences. To address this issue, future studies would benefit from testing the extent to which different retention intervals affect the content and qualitative attributes of the recollected events.

A second factor that might have contributed to the differences between our findings and those from previous studies is the method used for eliciting recollections. Previous researchers required participants to recollect and record their memories in written form, whereas we used an interview method. To our knowledge, there is no investigation of how these different methods of eliciting memories affect recollection. However, people tend to use longer and more complex sentences when writing rather than speaking, and spoken language tends to include more repetitions, corrections and more informal expressions (e.g., slang, fillers). Moreover, spoken but not written language is shaped by the dynamic interaction between two or more people, and is augmented by timing, voice properties and non-verbal signals. In view of such differences, it is likely that at least some of the differences between our findings and those from previous studies stem from the methods used for eliciting memories.

The social nature of the interview method we used for eliciting recollection might also have had a distinct impact on the findings. Although the interview method we used followed a detailed script, it is possible that participants were influenced by how the experimenter reacted to their recollections. Specifically, it is possible that participants focused on producing recollections that appeared to trigger positive experimenter reactions (i.e. smiling) while suppressing recollections that produced no experimenter reaction or negative reactions (i.e. frowning). Participants might also have avoided recollecting events which reflected poorly on their student status. Further research is required for determining strategic differences in recollections that are obtained by different methods for eliciting recollections.

The interview method we used is labor intensive, and for this reason, our study sample was relatively small. Nevertheless, our study produced novel findings and augments the results from previous investigations. Specifically, our results showed distinct memory attribute differences between lower and upper year students, including emotionality, narrative perspective, and content. Our qualitative method has yielded insights into the content of participants' recollections, and has allowed us to validate that each memory is complete and a distinct episode. Finer-grained analyses with a larger sample in the future might explore influences due to respondents' scholastic grade, gender, or choice of academic specialization. With larger sample sizes, future research might also consider the relationship between recollection differences and year of the university studies or amount of the university experience.

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